

## CLAIMS

We claim:

1. A method of maintaining milk production in a dairy cow fed a low phosphorus diet, comprising the steps of:

feeding a feed that contains about 0.3% by weight or less of an inorganic phosphorus supplement to a dairy cow; and

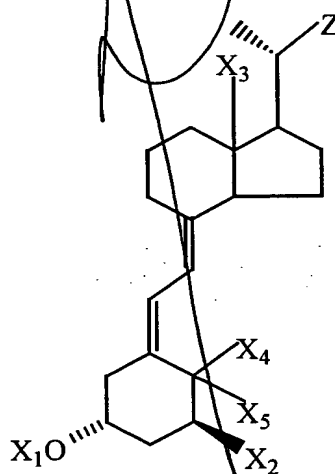
5 feeding with said feed an effective amount of a  $1\alpha$ -hydroxylated vitamin D compound for increasing phosphorus uptake in the cow's gut.

2. The method of claim 1 wherein said  $1\alpha$ -hydroxylated vitamin D compound is fed as a top dressing on said feed.

3. The method of claim 1 wherein said effective amount of the  $1\alpha$ -hydroxylated vitamin D compound comprises about  $0.1\mu\text{g/kg}$  to about  $100\mu\text{g/kg}$  of diet.

4. The method of claim 1 wherein the feed contains 0% by weight of an inorganic phosphorus supplement.

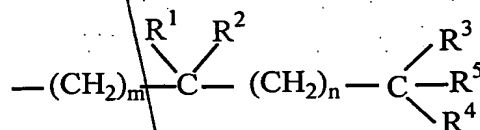
5. The method of claim 1 wherein said  $1\alpha$ -hydroxylated vitamin D compound is characterized by the following general structure:



5 where  $X_1$  may be hydrogen or a hydroxy-protecting group,  $X_2$  may be hydroxy, or protected hydroxy,  $X_3$  may be hydrogen or methyl,  $X_4$  and  $X_5$  each represent

hydrogen or taken together  $X_4$  and  $X_5$  represent a methylene group, and where Z is selected from Y, -OY, -CH<sub>2</sub>OY, -C≡CY and -CH=CHY, where the double bond may have the cis or trans stereochemical configuration, and where Y is selected

10 from hydrogen, methyl, -CR<sub>5</sub>O and a radical of the structure:



where m and n, independently, represent integers from 0 to 5, where R<sup>1</sup> is selected from hydrogen, hydroxy, protected-hydroxy, fluoro, trifluoromethyl, and C<sub>1-5</sub>-alkyl, which may be straight chain or branched and, optionally, bear a hydroxy or

15 protected-hydroxy substituent, and where each of R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup>, independently, is selected from hydrogen, fluoro, trifluoromethyl and C<sub>1-5</sub> alkyl, which may be straight-chain or branched, and optionally bear a hydroxy or protected-hydroxy substituent, and where R<sup>1</sup> and R<sup>2</sup>, taken together, represent an oxo group, or an alkylidene group, =CR<sub>2</sub>R<sub>3</sub>, or the group -(CH<sub>2</sub>)<sub>p</sub>-, where p is an integer from 2 to 5, and where R<sup>3</sup> and R<sup>4</sup>, taken together, represent an oxo group, or the group

20 -(CH<sub>2</sub>)<sub>q</sub>-, where q is an integer from 2 to 5, and where R<sup>5</sup> represents hydrogen, hydroxy, protected-hydroxy, or C<sub>1-5</sub> alkyl.

6. The method of claim 1 wherein the vitamin D compound is 1α-hydroxyvitamin D<sub>3</sub>.

7. The method of claim 1 wherein the vitamin D compound is 1α,25-dihydroxyvitamin D<sub>3</sub>.